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Ecological Observations on *Dialommus fuscus* (Labrisomidae), the "Four-Eyed Blenny" of the Galápagos Islands[1]

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ABSTRACT: Information is presented on the behavior, abundance, and distribution of *Dialommus fuscus* Gilbert in its intertidal habitat on the island of Santa Cruz, Galápagos Archipelago, Ecuador.

IT IS SURPRISING THAT *Dialommus fuscus* Gilbert, a labrisomid endemic to the Galápagos Islands with a vertical eye division (whence came the name "four-eyed blenny"), has been studied almost exclusively for its unique eye structure (Munk 1970, Stevens and Parsons 1980), and its natural history is only incidentally referred to (Clark 1936). This note presents some observations made in July 1997 on the behavior, abundance, and distribution of *D. fuscus* in its intertidal habitat on the island of Santa Cruz, Galápagos Archipelago, Ecuador. The observation site was a flat reef zone west of Tortuga Bay, 3 km from Puerto Ayora, Santa Cruz, Galápagos, between the beach of Tortuga Bay and the entrance to the adjoining lagoon, at 0° 45′ S and 90° 25′ W.

The black basaltic rock flat of approximately 200 m length (along the natural dam composed of basalt boulders) and 25 m width is flooded during high tide. A tidal difference of approximately 1 m leaves the rock flat dry during low tides. Shallow depressions form rock pools where *D. fuscus* and a goby (*Bathygobius* [G. Merlen, pers. comm.]) can be found.

The uppermost fringe of the section observed (12 m wide) was dry 50% of the time 2 hr after high tide (but repeatedly flooded by waves). The lower limit of the section was dry 50% of the time 5 hr after high tide.

Behavior

As soon as incoming waves covered the rock flat only approximately 50% of the time, *D. fuscus* emerged from rock pools. The dark color of the fish provided excellent camouflage on the black stone substrate. Individual fish moved to the top of basalt rocks and appeared to search for food. Occasionally they bit the rock surface, presumably at some prey (which in itself was invisible to the observer because of the distance). The fish clearly did not scrape off algae from the rocks. No particular posture of their heads could be distinguished in the moment of picking at their prey, and *D. fuscus* did not move the head before biting.

The fish also searched for prey in the tide pools, slowly searching the pool wall surface and occasionally picking at some prey. The head was kept straight forward, the mouth facing the prey.

Dialommus fuscus also jumped from rock to rock or on top of water surfaces, flicking its tail so rapidly that it "surfed" across the water, very much like a flat stone thrown at a low angle across a water surface, touching the water surface every 20 to 30 cm.

Most terrestrial excursions took place where the rock flat was still frequently washed over by waves. On average the excursions lasted no more than about 5 min, because the fish returned to pools of water frequently (either by way of an incoming wave or by slowly crawling into the water again). Fish did not stay in the water for periods longer than approximately 5 min either. On overcast days they may, however, spend 15–20 min out of water, always in the splash

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zone and sometimes among weeds such as *Ulva* (G. Merlen, pers. comm.). Peak terrestrial activity of *D. fuscus* was observed where waves occasionally covered the substratum. The behavior of *D. fuscus* reflects a limited ability to endure the physiological stresses of terrestrial sojourns.

No interactions between individuals were noticed. Distance between individuals was never smaller than 0.5 m, but no active avoidance of intraspecific contact was noticed.

At very low tide, excursions out of water were restricted to the vicinity of tide pools, and the presence of *D. fuscus* in the area was much less conspicuous.

Distribution in Tide Pools

Ten tide pools did not contain any fishes. The remaining 23 tide pools contained a total of 34 *D. fuscus,* 37 gobies, and 1 juvenile *Abudefduf* sp. The gobies were never seen leaving the water. There were usually not more than three *D. fuscus* in each occupied tide pool (in one pool three fish of over 6 cm total length and six juvenile fish under 2 cm total length were found taking refuge under a stone).

Abundance

Abundance was estimated to be as high as one fish per square meter. Whenever a wave washed over an individual, it did not remain in the same place, but afterward could be seen in a pool of water where the wave presumably had carried it. The water turbulence, however, made it impossible to distinguish between active and passive movement.

There was no correlation between tide pool volume and number of *D. fuscus* ($r = 0.01$, $P < 0.05$), but a strong correlation between tide pool volume and number of gobies ($r = 0.89$, $P < 0.05$). Gobies were much more frequent in larger tide pools, whereas *D. fuscus* were found in both small and large tide pools. There seemed to be no negative interference between gobies and *D. fuscus*: no significant correlation between number of gobies and number of *D. fuscus* ($r = 0.13$, $P < 0.05$) was found.

Worldwide, comparatively few fish species leave the water for terrestrial sojourns. The amphibious behavior of *D. fuscus* is most similar to that of *Mnierpes macrocephalus* (Labrisomidae) of the eastern tropical Pacific Ocean (Graham 1973). Both fish species spend only short periods of time outside the water. Bennett and Griffiths (1984) discovered that in rock pools on the coast of South Africa, pool size and number of fishes inhabiting each pool were positively correlated. The number of juvenile *Coryphoblennius galerita* rises with tide pool volume on the coast of Portugal (Nieder 1993). In the Galápagos observation area, this is true for gobies but not for *D. fuscus.* Conspicuously, their number is independent of pool volume. Water quality (temperature, oxygen content) probably does not affect the semiamphibious *D. fuscus* to the same degree as it affects nonamphibious fishes such as the gobies.

Dialommus fuscus becomes accustomed to human presence remarkably quickly and can be approached with little difficulty (G. Merlen, pers. comm.). It should be rewarding to study this unique fish in the context of the simply structured intertidal fish community of the Galápagos Islands.

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